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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/691,466

10/22/2003

William W. Morey

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02/03/2005

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EXAMINER

CHANG, AUDREY Y

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 02/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/691,466	MOREY ET AL.	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>8/20/2004</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Objections

1. Claims 5 and 12-20 are objected to because of the following informalities:

(1). The phrase “retroprisms” recited in claim 5 is confusing and indefinite since it is not clear what is considered to be a “retroprism”.

(3). The phrase “in an optical device a diffractive optical system” recited in claim 12 is confusing and indefinite since it is not clear what is the structural and logical relationship between the device and the system.

(3). The alternative phrase recited claim 20 is confusing and indefinite since the elements recited in the alternative phrase are not equivalent to each other which makes scopes of the claim unclear.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. **Claims 1-6 and 10-11 are rejected under 35 U.S.C. 102(e) as being anticipated by the patent issued to Chen et al (PN. 6,563,977).**

Chen et al teaches a *diffractive optical system*, (Figures 1 and 4) in a multiplex/demultiplexing device (2 or 40) that is comprised of a *directing element* (10 or 50) that directs an inputted optical signal to a *transmissive grating assembly* (12 or 44) serves as the *means for repeatedly transmitting and diffracting* the directed optical signal into multiple channels of distinct wavelengths and a *reflector* (8 or

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52) that receives the multiple channels from the grating assembly and reflects the multiple channels back toward the means for repeatedly transmitting and diffracting, (please see Figures 1 and 4, columns 7-8 and 12-13).

With regard to claim 2, the multiple channels reflected by the reflector are transmitted through the means for repeatedly transmitting and diffracting or the grating assembly, (12 or 44).

With regard to claim 3, Chen et al teaches that the multiple channels are transmitted through the grating assembly (44, Figure 4) at least two times.

With regard to claim 4, the directing element (10 or 50, Figure 1 or 4) is a bi-convex lens.

With regard to claim 5, the reflector is a mirror or mirrors, (please see Figures 1 or 4).

With regard to claim 6, Chen et al teaches that the grating assembly (12 or 44) is *angled* with respect to the directing element and the reflector, (please see Figures 1 and 4).

With regard to claims 10 and 11, Chen et al teaches that the multiplex/demultiplexing device has a *waveguide* array (6, Figure 1) having at least one input waveguide (4) and at least two output waveguides for receiving the multiple channels from the grating assembly, (Figure 1).

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 7-9, and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Chen et al.**

Chen et al teaches a *multiplex/demultiplexing device* (2, Figure 1 or 40 Figure 4) that is comprised of a *diffractive optics system* (12 or 44) wherein the multiplex/demultiplexing device comprises a *waveguide array* (6, or 43) including an *input fiber* that directs an optical signal into the diffractive optics system. The device further comprises a *directing element* (10 or 50) that directs the inputted optical signal to the diffractive optics system including diffractive optical element (DOE) that diffracts and transmits the directed optical signal into *multiple channels* of distinct wavelengths and a *reflector* (8 or 52) that receives the multiple channels from the diffractive optics system and reflects the multiple channels back toward the diffractive optics system, (please see columns 7-8, and 12).

This reference has met all the limitations of the claims with the exception (with regard to claim 7 also) that the diffractive optics system does not include two diffractive optical elements. However, Chen et al in a different embodiment teaches that two identical or similar diffractive optical elements (70 and 72, Figure 6) that are positioned at a *non-zero angle* with respect to each other can be used in the multiplex/demultiplexing device for making the optical signal into multiple channels of different wavelengths. It would then have been obvious to one skilled in the art to apply the teachings of Chen to modify the multiplex/demultiplexing device to use two diffractive optical element or grating assembly placed at a non-zero angle with respect to each other for the benefit of allowing the multiplex/demultiplexing device to have a folded geometric arrangement so that the device can be design to have a desired shape that fits to different application requirements. With regard to claim 8, Chen et al does not teach explicitly that the diffractive optical element is a binary transmission grating. However binary grating is a very well known type of diffraction grating in the art to make the diffractive optical element a binary grating would have been obvious to one skilled in the art for the benefit of making the diffractive optical element to desired diffraction efficiency. With regard to claim 9, Chen et al does not teach explicitly that second diffractive optical element is attached to the reflector. However in a different embodiment, Chen et al does teach that the diffractive optical element can be attached to the reflector

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(Figure 2). It would then have been obvious to one skilled in the art to make the diffractive optical element attached to the reflector for the benefit of making the device with a more compact design.

With regard to claim 14, Chen et al teaches that the waveguide array is placed at the focal plane of the directing element, (10 or 50).

With regard to claims 15-16, Chen et al teaches that the diffractive optical element is transmission diffraction gratings and it is preferably a *holographic* diffractive grating, (please see column 8, lines 25-30).

With regard to claims 17-18, Chen et al teaches that a polarization-rotating element (14, Figure 1 and 46 Figure 4) is used to prevent polarization dependent loss. This reference teaches the polarization rotating element is a birefringent element but it does not teach that it is placed between the directing element and the first diffractive optical element and it does not teach explicitly that it also include a half wave plate. However Chen et al does teach explicitly that the idea of having the polarization rotation element is to introduce a 90 degree rotation of one component of the polarization light, either in combination with the reflection at the reflector or not, so that P polarized light will be rotated to S polarized light and the polarization dependent loss can be eliminated. It would then have been obvious to one skilled in the art to use birefringent element and half wave plate as the polarization rotation element to provide the 90 degree polarization rotation for the benefit of using known elements in the art to provide the desired polarization rotation. It is implicitly true that the position of the polarization rotation means does not affect its function, namely converting P-polarized light into S polarized light. It would then have been obvious to one skilled in the art to place it at desired location for the benefit of making the device fitted for specific applications.

With regard to claim 19, Chen et al teaches a folded arrangement of the diffractive optical elements and the reflector, (please see Figures 1, 4 and 6).

With regard to claim 20, Chen et al teaches a multiplex/demultiplexing device.

6. **Claims 21-24 and 25-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Mitamura et al (PB. 6,646,805) in view of the patent issued to Chen et al.**

Mitamura et al teaches a device and method for *multiplexing and/or demultiplexing an optical signal* wherein the device comprises a *lens* (308, Figures 32-43) for directing a multiplexed optical signal along a predetermined path and a first and second *diffractive optical elements* (320, 321 Figure 32 or 438, 439 Figure 43) for performing a first and second diffractions on the optical signal to separate the multiplexed optical signal into a plurality of channels of different wavelength and further dispersing the channels and a *reflector* (309) for reflecting the plurality of channel after the second diffraction.

This reference has met all the limitations of the claims with the exception that it does not teach explicitly to use a plurality of waveguides to output the plurality of channels. **Chen et al** in the same field of endeavor teaches a multiplex/demultiplexing device wherein a waveguide array having at least one input fiber and a plurality of output fibers for inputting multiplexed optical signal into the device and outputting the multiple channels of the signal out of the device, (please see Figure 1). It would then have been obvious to apply the teachings of Chen et al to modify the arrangement of Mitamura et al to use waveguide array as means for efficiently inputting and outputting the optical signal.

With regard to claims 22-23, the diffractions are performed by the first and second diffractive optical elements respectively, and the reflected multiple channels are transmitted through the first and second diffractive optical elements.

With regard to claim 26, Mitamura et al teaches that the diffractive optical element has a binary profile, (please see Figures 32 and 33).

With regard to claim 27, Mitamura et al does not teach explicitly that the first and second diffractive optical elements are angled. **Chen et al** in the same field of endeavor teaches that a pair of diffractive optical elements (70, 72, Figure 6) that are disposed at non-zero angle with respect to each

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other is used to achieve the multiplexing/multiplexing function. With regard to claim 28, Chen et al further teaches that the lens and reflector can be also at *angle* with respect to the diffractive optical element, (please see Figures 1-6). It would then have been obvious to one skilled in the art to apply the teachings of Chen et al to make the diffractive optical elements at non-zero angle with respect to each other and the lens, the diffractive optical element and the reflector at angle to each other to make the device with more compact arrangement.

With regard to claim 29-30, Mitamura et al teaches that the inputted optical signal is demultiplexed by the system into a plurality of wavelength distinct channels and combined into multiplexed optical signal.

With regard to claim 31, Mitamura et al teaches that the lens, the diffractive optical elements and the reflector are placed in a telemetric mode.

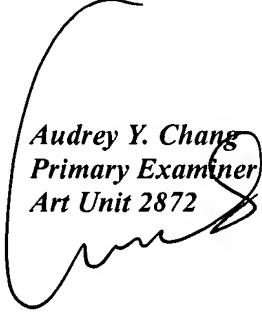
Contact Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Audrey Y. Chang
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.